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10/056,271

01/23/2002

Gary R. Janik

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05/21/2004

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EXAMINER

STOCK JR, GORDON J

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 05/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/056,271

Applicant(s)

JANIK ET AL.

Examiner

Gordon J Stock

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) 22,23,25,26,38-40,45,46,48 and 49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21,24,27-37,41-44,47 and 50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20020123
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Species in Paper Received on March 29, 2004 is acknowledged.
2. **Claims 22, 23, 25, 26, 38-40, 45, 46, 48, 49** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper Received on March 29, 2004. As for applicant's request for an updated characterization of species, Examiner agrees that Species I of Figs. 2a and 2b should be characterized as a film analysis system comprising a two step film analysis operation and that Species II of Figs. 3a and 3b should be characterized as a film analysis system comprising a three step film analysis operation. Both systems (species I and II) may comprise either optical or non-optical analysis modules. As for the generic claims, Examiner does not entirely agree with applicant's submission, for claims 13-15 are specific to species I (see paragraphs 23 and 31 of applicant's disclosure). Therefore, claims 1-12, 16-20, 27-37, 41, 43, and 50 would be the generic claims.

Information Disclosure Statement

3. The information disclosure statement filed on January 23, 2002 has been considered by the Examiner except for one reference. The listed pending U.S. application not considered lacked a filing date and is now issued U.S. Patent 6,734,968.

Specification

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the

Art Unit: 2877

following is required: "a non-functional region of the test sample" of claims 19 and 35 lacks antecedent basis in the specification. Corrections required.

Drawings

5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "optical fiber for transmitting the laser beam from an energy beam generator to the portion of the contaminant layer" of claim 17 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

6. **Claim 42** is objected to for the following: "the thin film analysis module" lacks antecedent basis. Correction is required.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. **Claims 1, 8, 14, 17, 18, 20, 21, 24, 27, 28, 33, 36, 37, 41, 44, 47, and 50** are rejected under 35 U.S.C. 102(b) as being anticipated by **Elliott et al. (5,669,979)**.

As for **claims 1, 8, 14, 17, 18, 20, 21, 24, 27, 28, 33, 36, 37, 41, 44, and 47**, Elliott discloses in a photoreactive surface processing system: an energy beam (pulsed) source for

Art Unit: 2877

directing an energy beam at a contaminant layer; a thin film analysis module, a light scattering monitoring system; maybe a pulsed laser source such as an alexandrite source (Fig. 15: 420 and 520; Fig. 13 for type of sample being cleaned and tested; col. 20, lines 20-40; col. 21, 10-45). A fiber may be used to transmit the laser light to the test region (col. 26, lines 20-30). The system may comprise a flashlamp (col. 11, lines 60-67). The beam spot is 20 microns by 20 microns or larger in area (col. 10, lines 64-67). The probe beam of the monitoring laser is approximately at the same position as the cleaning laser (Fig. 15: 518, 420, 428, 416). The surface may include a thin film (Fig. 13 and col. 26, lines 1-30). As for a second location of cleaning and monitoring, the wafer is scanned thereby multiple areas of exposure and measurement may be accomplished (Figs. 10a and 10b).

As for **claim 50**, Elliott discloses a wafer comprising a thin film, a photoresist, a substrate; and a contaminant layer with an exposed area for analysis (Fig. 13).

9. **Claims 1, 7, 8, 24, 27, 28, 32, 33, 41, 42, and 47** are rejected under 35 U.S.C. 102(b) as being anticipated by **Abercrombie et al. (5,666,063)**.

As for **claims 1, 7, 8, 24, 27, 28, 32, 33, 41, 42, and 47**, Abercrombie in a method for testing an integrated circuit discloses an energy beam source for directing energy beam at a contaminant layer during a cleaning operation, removing a contaminant layer off of another layer, a C4 bump, a first location, on a packaged integrated circuit (col. 4, lines, 5-30; col. 5, lines 19-45; Figs. 1 and 2); the probe card comprising probe needles is an electrically contact based system which would measure the resistance at the cleaned C4 bump; therefore, the locations of the cleaning and the resistance measurement would be similar (col. 6, lines 35-60). The energy source comprises a pulsed laser (Fig. 2: 28; col. 2, lines 55-60).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. **Claims 2-5, 29, and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott et al. (5,669,979)** in view of **Lensing (6,383,824)**.

As for **claims 2-5, 29, and 30**, Elliott discloses everything as above (see **claims 1 and 30**). He discloses that the monitoring system comprising a light scattering system (col. 21, lines 30-35). He is silent concerning reflectometry, ellipsometry, SE, or SWE. However, Lensing in a system of processing a substrate teaches using scatterometry in controlling semiconductor manufacturing (col. 2, lines 60-65; col. 4, lines 8-20) that may comprise single wavelength ellipsometry, reflectometry, spectroscopic ellipsometry (col. 6, lines 40-65). Therefore, it would be obvious to have the monitoring system comprise an ellipsometric, single wavelength ellipsometric, spectroscopic ellipsometric, or a reflectometric system, for these systems all deal with light scattering and all deal with observing layers such as with dealing with laser ablation.

12. **Claims 9-13, 15, 34, and 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott et al. (5,669,979)** in view of **Morris et al. (6,472,295)**.

As for **claims 9-13, 15, 34, and 43**, Elliot discloses everything as above (see **claims 8, 33, and 41 above**). In addition, Elliott discloses the use of a Nd:YAG pulsed laser operating at 532 nm, 355nm, 266nm, and 1064nm (col. 12, lines 13-20). As for the laser being a modulated continuous laser with a laser diode and being q-switched, Elliott is silent. However, Morris

Art Unit: 2877

teaches in an apparatus for laser ablation teaches that a pulsed Nd:YAG laser comprises a diode and suggests that it is continuous made pulsed through modulation and q-switching (col. 2, lines 30-55). Therefore, it would be obvious to one skilled in the art that the system comprised a continuous laser made pulsed through modulation that is also q-switched and comprised a laser diode for a pulsed Nd:YAG laser has q-switching, modulation, and comprises a laser diode.

13. **Claims 6 and 31** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott et al. (5,669,979)** in view of **Fukuda et al. (4,876,983)**.

As for **claims 6 and 31**, Elliott discloses everything as above (see **claims 1 and 27**). He discloses that the monitoring system comprising a light scattering system (col. 21, lines 30-35). And that Auger analysis may be used to identify contaminants (col. 55-60). As for a electrically based non-contact system, Fukuda in a plasma operation apparatus suggests that Auger analysis is a non-contact system that deals with scattering (col. 11, lines 25-55). Therefore, it would be obvious to one skilled in the art to have the system comprise a non-contact electrically based system such as Auger electronic spectroscopy to determine purity of the test area and therefore possible presence of residual contaminants.

14. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott et al. (5,669,979)** in view of **Haight et al. (6,333,485)**.

As for **claim 16**, Elliott discloses everything as above (see **claim 1**). However, he is silent concerning the laser producing energy between 5 and 100 microjoules. Haight in a method for minimizing sample damage during laser ablation teaches of using a pulse energy between 10 nanojoules and 1 millijoule to prevent undesired damage to the material underneath the ablated surface (col. 1, lines 45-50; col. 3, lines 10-15). Therefore, it would be obvious to one skilled in

Art Unit: 2877

the art at the time to have the pulse energy between 5 and 100 microjoules, for an energy between 10 nanojoules and 1 millijoule prevents undesired damage to the material underneath the ablated surface.

15. **Claims 19 and 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott et al. (5,669,979)**.

As for **claims 19 and 35**, Elliott discloses everything as above (see claims 1 and 27 above). As for a non-functional region, Elliott does not explicitly state that the analysis area comprises a non-functional area. However, ion implantation is used to fabricate semiconductor devices; whereby, there would be areas of ion doping and area of no ion doping (col. 23, lines 5-55). Therefore, it would be obvious to one skilled in the art at the time that the test sample would comprise areas of non-functionality and functionality for a test sample such as a wafer has areas that are ion doped and not ion doped.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306

Art Unit: 2877


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

gs

May 11, 2004


Zandra V. Smith
Primary Examiner
Art Unit 2877